Android App Based Smart Car Parking Reservation

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Abstract- *To increase their standard of living, people buy vehicle for transportation. One of the problems faced by the vehicle owners in metro cities is where to park their vehicles. In order to reduce the time and fuel wastage, A parking reservation system is developed in such a way that users book their parking slots through short message services (SMS).The booking can be done through the device called GSM, Which is used to send a SMS to the user. The slot availability at a particular place is sensed by the sensor and send the details to the Microcontroller .Once the sensor range is fixed the RFID tag stops transmitting the data, and the system recognizes the slot as booked. Once the RFID tag of the user matches booked RFID the gate model opens the gate for parking the vehicle. If the RFID tag doesn't matches the system won't respond .An Mobile based application is used to commanded the entering or leaving from the parking slot.*

Keywords- Car Parking, Parking Reservation, SMS, GSM, RFID.

I. INTRODUCTION

Nowadays car parking is a major problem in metro cities which has tiniest availability of parking space. Advanced technologies can be implemented to overcome this problem in an effective manner. An mobile application is developed for effective parking system. Using this application, free slots can be booked for parking the vehicle. Inductive proximity sensor check the whether the slot is empty or not and sends the information to ATMEGA controller. GSM is used as a transceiver. There is an RFID (Radio-frequency Identifier) used to check whether the booked vehicle has attained in the allotted slot at the particular time. Radiofrequency identification uses the electromagnetic fields for data transferring purpose automatically, by identifying and tracking the attached objects. The information in this tags are electronically stored.

II. LITERATURE SURVEY

Parking managing systems have become an vital application in most of the developed countries in the world since last epoch. Since parking spaces are now a days are mostly concealed and very large in size, it is difficult to manage the system manually. Automatic parking management systems normally provide several main services such as, automatic gate opening, ticket issuing, number plate detection, select empty spaces for parking, fee calculation, etc. We present a parking management system developed using the GSM/GPRS. A parking management system by reducing the drivers' searching time for vacant car-parking space, in turn refining the traffic flow in the car park areas is presented in [1]. This is achieved by the use of Fiber Bragg Grating Sensor (FBG) sensor instrumentation in vehicle parking management system. This work involves entrenching an array of FBG sensors concealed in the parking space, then determining the strain variations on the FBG sensor due to load functional by the vehicle parked in the parking space, occupancy of the parking space is determined [1]. Real-time monitoring system for parking space management services was introduced in [2] with the amenities of live information to users in order to make it easy for them to look for vacant parking slot, it also give authority to operators to monitor and perform simulations to demonstrate the real parking system. The principles of queue theory is applied into parking system modeling. The queue system model enables the forecasts of arrival and service time in the system through analysis and calculations. Further, this allow parking section workers to monitor the status of the parking slots and view the information of arrival rate, service time and so on. [2].A parking support system based on WSN integrated with IP capability using wireless microcontrollers is presented in [3]. The support system habitually communicates the status of each and every parking slot to a central server. This data is used to guide the user to the nearest free parking slot or to the user's parked vehicle. Further their system can also reserve the predefined slots for a specific time period for private users [3]. A management system for motorcycle parking lot is presented in [4]. This system is based on the Radio Frequency Identification (RFID) system, Visual Basic (VB) language and MySQL system. The MySQL is used to construct a database for recording the parking information and the VB is assumed to design the software interface for retrieving database. Then, their system uses PHP to construct parking information page. The car owners can use RFID tag to record the parking information. The users can use browser for mobile devices to request the parking information [4]. GSM standardization was taking place by European Telecommunication Standard Institute (ETSI), but now the 3rd Generation Business Project (3GPP) does the standardization. The GPRS system provides packet

switched carrier services to the existing GSM system. In GPRS network a user can access public data networks straightly using IP. GPRS supported mobile unit can use between 1 and 8 stations over the air interface and, uplink and downlink channels are separated. Resource sharing in GPRS is lively based on the demand and the available resources [5]. Telecommunication industry has become inexpensive and extremely flexible after the creation and introduction of GSM/GPRS (Global System for Mobile Communications/ General Packet Radio Service). Initially the technology was used merely on telecommunication but afterwards it has combined into more of a framework for the other applications require long range distant data transfer. Most of the applications depend on one very important aspect, which is communication and data transfer. The communication should be well planned when it comes to cost and difficulty. This problem is addressed by applying algorithms using single board computer (SBC) development environments like Arduino(www.Arduino.com)[6]. The implementation of altered data structures and algorithms play a substantial part when the embedded Micro Controller Unit (MCU) has limited memory.

III. PROPOSED WORK

The proposed architecture of the car parking system aims to develop a car parking system by Mobile application. The Proposed system architecture design includes two sub-architectures – one for authenticating the car and another one for the parking area. The available parking slots in the given area is listed as requested by the user in the mobile app and the same is shown in the figure1. The parking system communicates with the GSM. The parking control system is responsible for proper parking of the vehicle to the destined position.

The proposed system is divided into 4 modules: -

1) Mobile Application Development.
2) Interfacing GSM with Microcontroller.
3) Interfacing RFID Module with Microcontroller.
4) Interfacing LCD with Microcontroller.

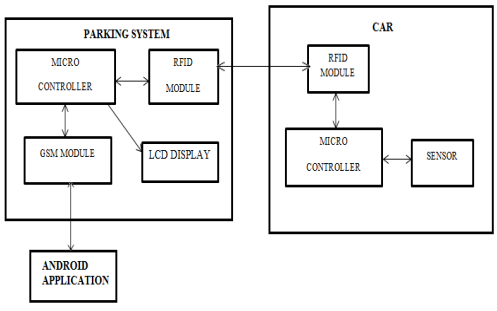

Figure 1.Proposed Car Parking System Architecture

MODULAR DESCRIPTION:

1. Mobile Application Development

An Mobile Application is developed for instantiate the system. The Mobile Application to be designed would generate encoded message that shows the availability of parking slot. The parking control unit decodes the message and depending on the status of the parking area, reply is sent back in encoded form. This message would be receive at the parking area unit by the GSM. The GSM sends the message to microcontroller and response would be sent to the user. LCD displays the current status.

2. Interfacing GSM with Microcontroller

The GSM module is used for sending and receiving messages to or from the microcontroller. The GSM module is shown in the architecture diagram. Data obtained from the mobile phone is buffered in the GSM module and then transmitted serially.

Figure 2.GSM Module

3. Interfacing RFID Module with Microcontroller

RFID Module is an electronic circuit to transmit and receive radio signals on number of carrier frequencies. This paper uses RFID module for the data communication between the microcontroller of the parking area and that of the car.

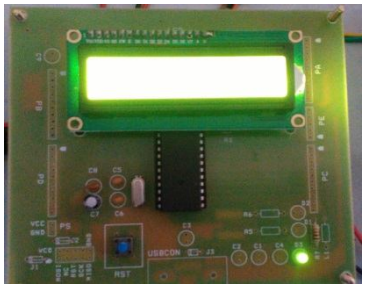

Figure 3.Micro controller Unit

4. Interfacing LCD with Microcontroller

LCD Unit is used for displaying the parking slot status to the user. The LCD module displays commands for parking slot availability, GSM initialization. The LCD module communicates with the micro-controller and displays the details of free slots to the user.

IV. FLOW CHART

First, the user sends a reservation message to the microcontroller in command characters. The microcontroller will process the SMS request and reply back to the user upon confirmation of reservation. At the same time, the microcontroller transmit the values to the main controller circuit. Once the confirmation message has been sent, the reservation time will automatically start. The user has to reach at the parking area within the time limit or else the reservation process will be expired. After the end of the time, the microcontroller will send the expiry message to inform the reservation has expired The SMS data transmission was done wirelessly using the Global System for Mobile Communication (GSM) antenna.

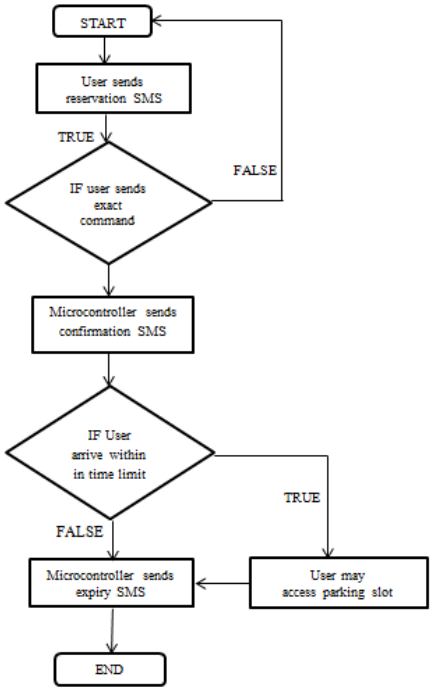

Figure 4. Parking Reservation Flow Chart

V. SIMULATION RESULT

The Fig.5 and Fig.6 shows output of the car parking system using proteus.

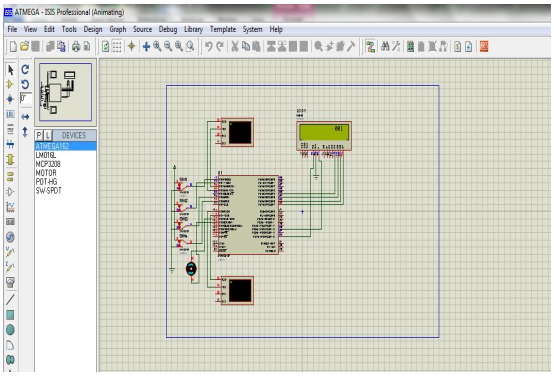

Figure 5. Free space using Proteus

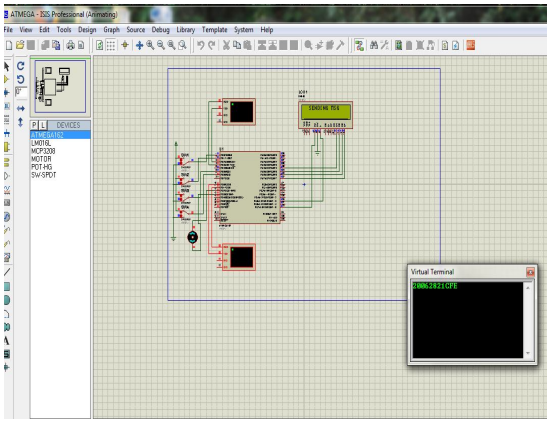

Figure 6. Entrance gate of the parking system using Proteus

VI. HARDWARE RESULT

The Fig.7 and Fig.8 shows output of the car parking system.

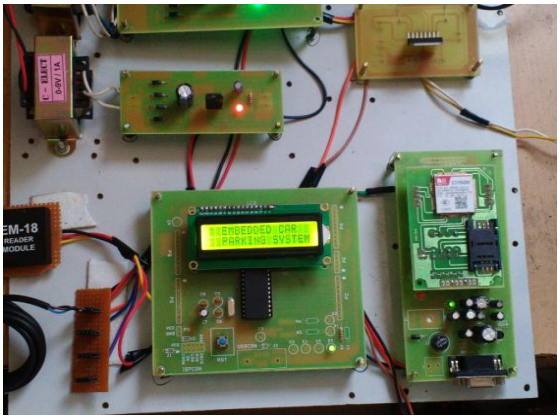

Figure 7. Embedded car parking system

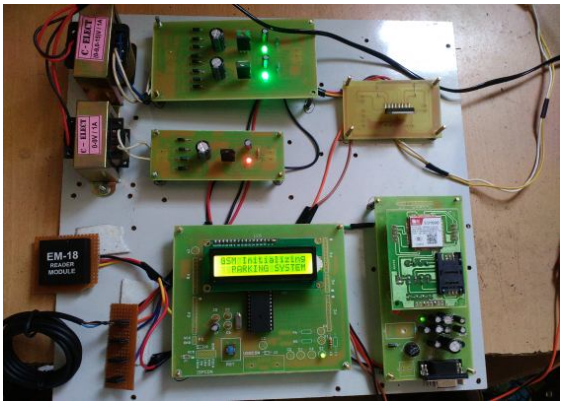

Figure 8. Gate model

VII. CONCLUSION

The proposed system examines on the model for allocating parking slots at a single place within the test environment. The simulation and hardware result for the above approach is implemented on the basis of FIFO and the system ensures that it reduces the tension of the car owners with safe car parking. The same system is to be extended at various identified locations within the campus where the near real time constraint can be fulfilled using optimization techniques.

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